MMC Materials Inc. – Rossville 24-0119 / construction permit 972180 to produce 130,000 yd^3/yr concrete

Allowable and actual particulate emissions for fabric filter control on silo loading, cement weigh batcher, and load out of concrete mix to a transit mix truck (truck load out)

1. Allowable stack emissions

1. **Silo loading**

25 tons of cement per truck load of cement or cement supplement delivered to a silo is typical and representative for concrete batch plants and will be used.
25 tons of cement per TL x 2000 lbs/ton x 1/491 lbs cement/yd^3 concrete = 101.833 yd^3 of concrete per TL of cement.
25 tons of cement supplement per TL x 2000 lbs/ton x 1/73 lbs cement supplement/yd^3 concrete = 684.9315 yd^3 concrete per TL of cement supplement.
The annual number of cement TLs = 130,000 yd^3 concrete/yr x 1/101.833 yd^3 of concrete per TL of cement = 1276.6 TLs cement/yr.
The annual number of cement supplement TLs = 130,000 yd^3 concrete /yr x 1/684.9315 yd^3 of concrete per TL of cement supplement = 189.8 TLs of cement supplement/yr.
The loading time for a truck load of cement or fly ash to a silo loading is 45 minutes.
The allowable PM during a truck load of cement or cement supplement using 45 minutes as the TL silo loading time = 0.25 grains/ft^3 x 2340 ft^3/min x 45 min/TL x 1 lb PM/7000 grains x = 3.76 lbs PM/TL
Corresponding annual hours for cement silo loading is 1276.6 TLs/yr x 45 min/TL x 1/60 min/hr = 957.5 hrs/yr
Corresponding annual hours for cement supplement silo loading is 189.8 TLs/yr x 45 min/TL x 1/60 min/hr = 142.4 hrs/yr
Hourly PM allowable for cement or cement supplement loading to the silo = 3.76 lbs PM TL/45 min/TL x 60 min/hr = 5.01 lbs PM/hr
The annual PM allowable emissions in lbs PM /yr for cement silo loading = 1276.6 TLs x 3.76 lbs PM/TL = 4800 lbs PM/yr
The annual PM allowable emissions in lbs PM/yr for cement supplement silo loading = 189.8 TLs/yr x 3.76 lbs PM/TL = 713.65 lbs PM/yr
The total annual PM allowable emissions in lbs/yr for both cement and cement supplement silo loading = 5513.65 lbs PM/yr

2. **Concrete batch plant operations**

The concrete batch plant and the associated equipment operate under a different time frame than truck loading to the silos.
The annual batch plant hours = 130,000 yd^3 concrete/yr x 1/200 yd^3/hr = 650 hrs/yr
The allowable PM for the cement batcher with a fabric filter (which handles both cement and cement supplement emptied from the silos into the cement weigh batcher) is calculated as follows
180 ft^3/min x 60 min/hr x 0.25 gr/dscf x 1 lb PM/7000 grains = 0.39 lbs PM/hr
The annual PM allowable emissions in lbs/yr for the cement batcher = 0.39 lbs PM/hr x 650 hrs/yr = 253.5 lbs PM/yr
The allowable PM for a truck loadout controlled by a fabric filter is calculated as follows:
The hourly allowable for the truck load out = 5880 ft^3/min x 60 min/hr x 0.25 gr/dscf x 1 lb PM/7000 grains =12.60 lbs PM/hr.
The annual PM allowable emissions in lbs/yr for truck load out = 12.60 lbs PM/hr x 650 hrs/yr = 8190 lbs PM/yr

Total annual allowable for Stack emissions:
4800 + 713.65 + 253.5 + 8190 = 13,957.2 lbs PM/yr or 6.98 tons PM/yr

2. Actual particulate emissions

Stack emissions.

1. Silo emissions:

a. **From pneumatic loading of cement** from a delivery truck to a cement silo with fabric filter:
Annual emissions are: 130,000 yd^3/yr x 0.000243 lbs/PM/yd^3= 31.6 lbs PM/yr for cement loading
Hourly PM emissions = 31.6 lbs PM/yr/957.5 hrs/yr = 0.033 lbs PM/hr

b. **From pneumatic loading of cement supplement (fly ash)** from a delivery truck to a cement supplement silo with fabric filter:
Annual emissions are: 130,000 yd^3/yr x 0.000325 lbs PM/yd^3 = 42.25 lbs PM/yr
Hourly PM emissions = 42.25 lbs PM/yr/142.4 hrs/yr = 0.30 lbs PM/hr

2. Cement batcher/cement weigh hopper emissions

a. **Loading cement from a cement silo to the cement batcher/cement weigh hopper** with a small fabric filter or cartridge filter control has essentially the same emissions and is similar control to that of pneumatic loading of cement from a truck to cement silo with a baghouse which has the same collection efficiency.

Annual emissions are: 130,000 yd^3/yr x 0.000243 lbs/PM/yd^3= 31.6 lbs PM/yr for cement loading
Hourly emissions = 200 yd^3/hr x 0.000243 lbs/PM/yd^3 = 0.049 lbs/hr

b. **Loading cement supplement (fly ash) from a silo to the cement batcher** with a small fabric filter or cartridge filter control has essentially the same emissions and is similar control to that of pneumatic loading of fly ash from a truck to a fly ash silo with a baghouse which has the same collection efficiency.

Annual emissions are: 130,000 yd^3/yr x 0.000325 lbs PM/yd^3 = 42.25 lbs PM/yr
Hourly emissions = 200 yd^3/hr x 0.000325 lbs/PM/yd^3 = 0.065 lbs/hr

3. Truck load out emissions with fabric filter control

Load out of the combined concrete mix of sand (S) and aggregate (A) from the S & A weigh hopper and cement and fly ash from the cement weigh batcher are discharged into the top of the transit mix truck) with suction applied during loadout with collected/captured emissions sent to a fabric filter (baghouse).

Annual emissions are: 130,000 yd^3/yr x 0.0276 lbs PM/yd^3 = 3588 lbs PM/yr
Hourly emissions = 200 yd^3/hr x 0.0276 lbs/PM/yd^3 = 5.52 lbs PM/hr

Total annual stack PM emissions:
31.6 + 42.25 + 31.6 + 42.25 + 3588 = 3735.7 lbs PM/yr or 1.88 tons PM/yr

Fugitive emissions.

1. Sand and aggregate handling emissions:

The total emission factor (AP-42) from the 6 operations comprising the handling of sand and aggregate is 0.0237 lbs PM/yd^3
Annual emissions are: 130,000 yd^3/yr x 0.0237 lbs PM/yd^3 = 3081 lbs PM/yr

2. Weigh hopper loading of sand and aggregate (S & A) emissions:

The weigh hopper or weigh batcher for handling sand and aggregate contains moist sand and aggregate and typically comes from washed sand and aggregate and in TN typically has low emissions and requires no control. A review of other air pollution agencies reveals essentially all batch plants do not have control nor do most regulatory agencies require control for this operation. The AP-42 emission factor denoted as weigh hopper loading of 0.0079 lbs PM/yd^3 is utilized.

Annual emissions are: 130,000 yd^3/yr x 0.0079 lbs PM/yd^3 = 1027 lbs PM/yr

Total annual fugitive PM emissions from S & A handling plus S & A weigh hopper loading =
3081 + 1027 = 4108 lbs PM/yr or 2.05 tons PM/yr 2-1-17 ERF